



1. SCOPE

The fuel filler pipe material system defined by this specification requires corrosion protection and resistance to Ford Test Fuels. The pipe construction is typically a low carbon electroplated sheet steel, formed and welded into tubing, with an organic immersion top coat which may form a duplex system. Stainless steel could also be used and may not require coating. Approved suppliers are on the Approved Source List.

2. APPLICATION

This specification was released originally for materials used for chassis mounted fuel filler pipes that may or may not be seen with wheels on ground and do not experience continuous operating temperatures above 121° C (250° F).

This specification is not intended to limit the substrate or coating to any specific material type or process, but define the performance of the system. This specification is intended for global use, unless noted on the Approved Source List. The coatings and materials approved to this specification may have fuel type restrictions.

2.1 LIMITATIONS FOR FUEL COMPATIBILITY ONLY

Note: All approved suppliers may not be approved for all of the Ford Test Fuels for liquid phase and vapor phase. See Product Engineering's Strategy/Design Rule for the fuel material compatibility approvals. Contact Materials Engineering for fuel compatibility data.

3. REQUIREMENTS

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.2 BASE MATERIAL AND COATING PROPERTIES (COATED PIPE ONLY)

3.2.1 Base Material and Coating

The Engineering Drawing shall specify the product trade name/product code number, substrate, pretreatment and all coating thicknesses in μm for outside and inside surfaces.

All requirements must be validated with actual production intent processes and tests performed on actual components.

3.2.2 Metal Preparation

The surface to be coated must be free from oil, alkaline residues, rust, dirt, moisture and other foreign materials that may prevent adhesion.

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3.3 FILM PROPERTIES (COATED PIPE ONLY)

3.3.1 Color

Black or as specified on the engineering drawing.

3.3.2 Initial Hardness

The finish shall be sufficiently cured at the time of packing to withstand normal handling and shipping without damage.

3.3.3 Appearance

The coating shall be a uniform film, showing no flow lines, pinholes, craters, flaking, cracking, peeling, blistering or excessive buildup that will affect sealing. Critical sealing surfaces with additional surface criteria (i.e. surface roughness) are to be noted on the Engineering Drawing. Part racking exceptions must be shown on the Engineering Drawing.

3.3.4 Coating Thickness, μm (FLTM BI 117-01, ASTM B 487)

As specified on
engineering drawing

Any suitable method may be used to measure coating thickness. Metallurgical cross-section is the final determinant.

A minimum of twelve measurements are to be taken per pipe: three in the funnel/bowl area, three in the midsection, three near the end of the pipe and three in the inside of the funnel bowl, unless otherwise specified on the Engineering Drawing. Each individual measurement must meet the minimum thickness, as specified on the Engineering Drawing. The minimum thickness will be established based on original test samples for the Corrosion and Fuel Compatibility Testing.

3.4 RESISTANCE PROPERTIES

3.4.1 Fuel Resistance (Coated and uncoated pipe) peeling (Fuels per FLTM AZ 105-02, Tests per FLTM BZ 105-03)

No softening or
of coating on coated
pipes (See note)

Note: Uncoated pipes could exhibit discoloration or oxide formation. The amount of allowable discoloration or oxide formation can vary depending on fuel and pipe material.

Requirement: Pass/Fail decision for fuel resistance must be determined by Materials Engineering and Core Fuel Product Engineering via the attached sign off form (Appendix 1). Reference FLTM BZ 105-03 for evaluation criteria. Additionally, coated pipes shall exhibit no permanent softening of coating after 24h drying at 23° +/-2° C and 50% relative humidity. Data and signoff will be stored in the Materials Engineering share drive.

The pipe must be requalified every 5 years. If a new fuel is added to FLTM AZ 105-02, the part must be retested to the new fuel.

3.4.2 Laboratory Accelerated Cyclic Corrosion Test (Coated and uncoated pipes) (CETP 00.00-L-467 for 12 weeks, X-scribe and Gravelometer)

Note: Precondition one side of the pipe using an X-scribe (Figure 1) with a carbide tip tool, per ASTM D 3359, and stone chip (Figure 2) one location on the other side of the pipe, per SAE J400 (Figures 3 and 4), 1 pint at room temperature.



- 3.4.2.1 Air Pressure Test No air bubbles.
- The pipes shall be pressure tested underwater to 140 kPa (20 psi) of air. There shall be no air leakage as indicated by air bubbles.
- 3.4.2.2 Gauge Loss (FLTM CA 005-01) Gauge loss x 3 < 50% of original gauge.
- The pipe should be reviewed to find the most severe corrosion areas. The most severe corrosion shall be lightly glass bead blasted to remove the corrosion. Using a point micrometer, find the thinnest area, triple it and compare to the original gauge in percent.
- 3.4.3 Vehicle Testing (Coated and uncoated pipes) (CETP 00.00-R343 for 12 weeks) Must pass requirements in GES 18-0040
- One vehicle test is required (See note).
- Note: Vehicle testing is required and should be planned for up front in order to validate the laboratory testing. Materials Engineering and Core Fuel Product Engineering may wave the vehicle test following successful laboratory testing of a new fill pipe construction if no corrosion vehicles are planned prior to J1.
- 3.4.4 Electrical Resistance (Coated and uncoated pipe) (SAE J1645) 1×10^6 ohms, max.
- Measurement of the finished component will be tested to ensure adequate conductivity to discharge any static electricity that may be generated.
- 3.4.5 Water Resistance, (Coated pipe only) (FLTM BI 104-01) No blistering or loss of adhesion
- X-scribe samples. Immerse samples 240 hours. Allow paint film to recover 1 hour at room temperature after immersion before evaluating.
- 3.4.6 Chip Resistance, (Coated pipe only) (SAE J400, 1 pint, room temperature) 6A, max
(less than 24 chips
Chip size < 1 mm)
- Test shall be conducted on production intent components. The test component must be painted on the same system as the production intent component.
- Note: See Figure 3 and Figure 4 for additional information.
- 3.4.7 Paint Adhesion, (Coated pipe only) (ASTM D 3359, Method A, X-scribe with carbide tip.) No loss of adhesion in scribe area.
- 3.4.8 Thermal Shock, (Coated pipe only) (FLTM BI 107-05, Carbide tip scribe only) No loss of adhesion in scribe area.